marked myocardial damage. It has been our practice to control chronic passive congestion first by the use of digitalis and other appropriate measures. When this stage has arrived we give quinidin in about the same manner as that described by the authors. We have at times given much larger doses, and in one case had to give a total of 18 grams over a period of about five days to restore the normal rhythm. There is altogether too much hesitation on the part of many practitioners to use such a valuable drug as quinidin has proven to be. Just as with any other potent drug, we must appreciate the indications for its use and then must give the drug until we have secured the desired effect or until toxic symptoms require the withdrawal of it. We should remember that quinidin is fairly rapidly eliminated and the dose must be fairly well spaced during the twenty-four hours, giving three or four doses a day. When the rhythm has been restored it is usually necessary to keep up small doses of the drug over a considerable period of time. After a period of weeks, or months, the dosage can be reduced keeping up the frequency, however, and later perhaps entirely abandoned. We have treated some patients who have suffered from paroxysmal attacks of auricular fibrillation over a period of four or five years with perfect satisfaction as long as the drug was continued. In most cases where mitral disease is present the progressive nature of the process on the mitral valve eventually brings about a state where quinidin has little or no value and then we can give digitalis. I do not agree with the point made by some writers to the effect that the patient is out of digitalis control with the normal rhythm. We usually find that if the quinidin is withdrawn, the irregularity returns. There are a few cases, however, where the heart rate is rapid and the function is impaired when the rhythm has been restored. In such instances the restoration of normal rhythm becomes an unhappy event. I do not know how we can anticipate this condition. In some instances a nodal tachycardia and even ventricular tachycardia or ventricular fibrillation may result. There are reports of several such occurrences in the literature. We had one patient who developed ventricular tachycardia and ventricular fibrillation while under the influence of quinidin but, fortunately for him, the attacks stopped when the quinidin was withdrawn and the patient lived for about seven years following these attacks. From these observations we have felt that quinidin has an action on the ventricular muscle as well as on the auricular muscle. I have used quinidin rather extensively in older persons who have developed paroxysmal attacks of auricular tachycardia or auricular fibrillation with considerable success. It is also of value in controlling extrasystoles either in the auricles or ventricles, but more especially in the former. I have given it in combination with strychnia according to the method suggested by Wenckebach with good results.

During the last few years we have come to appreciate the fact that larger doses of digitalis can be given to patients with myocardial failure and chronic passive congestion, with or without auricular fibrillation, than it was our custom to give in the past. However, I do not subscribe to the Eggleston method of giving massive doses of digitalis in the ordinary case. There are instances where strophanthin should probably be given intravenously or where large doses of digitalis should be given at once, but the danger of giving large doses to patients when first coming under observation is great, because in the occasional case one is not able to assure himself that the patient has not already been on digitalis and the massive dose given at once might cause his death. It is my practice to inquire first about the previous medication; to have the patient in bed and to give about 4 cc. every four hours until almost the full therapeutic dose has been given, making sure that the patient is seen by some member of the staff before the next dose is given. The dose is then reduced to 2 cc. every six hours, and when toxic symptoms are observed the drug is either stopped for twenty-four hours or continued with a dose of 1 cc. two or three times a day as indicated.

OVARIAN HEMATOMATA

WITH CASE REPORTS

By W. E. HUNTER, M. D.
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DISCUSSION *by Ezra C. Rich, M. D., Ogden; Ralph T. Richards, M. D., Salt Lake City; L. A. Stevenson, M. D., Salt Lake City.*

RECENTLY I have had under my care three patients who illustrate three unusual types of ovarian hematomata. These three patients presented such diverse symptoms that, even though they were carefully studied and consultants called, not one of the cases was definitely diagnosed until the time of operation.

Bovee says that no other organ in the body is so frequent a site of hemorrhage as is the ovary. Sampson of Albany states that fully 10 per cent of all women past thirty who come to operation for pelvic disease show some signs of hemorrhagic cystic disease of the ovaries. Many cases of ovarian hemorrhage are frequently overlooked and many cases are improperly diagnosed even after the abdomen has been opened.

I recall a case of a ruptured follicle of a serious nature which followed an industrial injury. The case caused considerable dispute concerning industrial liability, and the discussion between opposing physicians who were called to hear the case was quite acrimonious. I must confess I did not realize its true nature until I had a similar case in my own practice.

I recall other cases which I took to be ectopic gestation, which I have learned since were either hemorrhages from ruptured follicles or endometrial adenomas. I feel that most general surgeons are too prone to look upon intraperitoneal blood as *prima facie* evidence of ectopic gestation and be content with that diagnosis.

CLASSIFICATION

According to Phaneuf, ovarian hematomata can be divided clinically into three classes:

1. Cystic ovaries with hemorrhagic contents which become twisted on their pedicles.

2. Menstruating adenomas, variously known as perforating hemorrhagic (chocolate) cysts, endometrial cysts, endometrosis and implantation cysts.

3. Ovarian follicles and corpus luteum cysts which rupture and occasionally give rise to severe intraperitoneal hemorrhage.

ETIOLOGY

The cause of hemorrhage in the first variety can easily be understood. The blood supply becomes interfered with, the smaller vessels break and hemorrhage occurs. Most of these cases are variously diagnosed as appendicitis, renal colic, salpingitis or ectopic gestation.

In the second variety the bleeding is a physiologic process. There is either an embryonic inclusion of Müllerian tissue or a direct implantation of endometrial tissue, according to Sampson, which imitates the menstrual cycle of the mother tissue lining the uterus. These cases are much more frequent than is commonly supposed. They are often the cause of unexplained backache and dysmenorrhea. They are seldom diagnosed be-

fore operation and at operation are erroneously diagnosed as malignancy, pelvic inflammation or ectopic pregnancy.

In the third variety there is hemorrhage from the fragile vessels which nourish the developing egg or corpus luteum. According to Schumann there is no evidence of peri-oöphoritis or any other demonstrable morphologic change in the tissues. He thinks there might be a probable arteritis of obscure origin. Novak believes it is some form of physiological degeneration of the perifollicular vascular wreath of blood vessels. He also says that the principal predisposing factors (as might be expected) are conditions that bring about hyperemia of the ovary, with engorgement of its vessels. He has collected forty cases in literature of this type, showing intraperitoneal hemorrhage varying from one tablespoon to as much as two liters of blood. Trauma from coitus, bimanual examinations or trauma from external forces have been known to cause such hemorrhage.

CASE REPORTS

Case 1—The first patient was a fleshy, married woman, thirty-one years of age. After the birth of her child, then four months old, she had suffered from three attacks of sharp pain in the left abdomen. During this interval she had nursed the baby and had menstruated but once, about two weeks before the onset of the present attack. These attacks were about one month apart. She described them as lasting but a few minutes and as following a feeling of discomfort in the lower abdomen. Both husband and wife denied the possibility of pregnancy. No intestinal or urinary disturbance existed.

On June 17, she was awakened out of a sound sleep by a severe pain in the left midabdomen. She felt slightly nauseated but did not vomit. The pain gradually lessened but the lower abdomen remained rather sore. At 11 a. m. she had another attack, so severe that she cried out in agony.

When I saw the patient, after two of the attacks, she was feeling quite comfortable but was afraid of a subsequent attack. One hour later she was quite comfortable, but four hours later she had another attack. Physical examination at that time was negative, except for slight tenderness in the left lower quadrant. There was no fever and no bleeding from the uterus. The next morning the patient was seen in consultation by an internist, a general surgeon and genito-urinary specialist. A tentative diagnosis of renal calculus was suggested at this time, although the urine was negative. Several days later I saw the patient in the office. At that time a small definite mass was felt anterior to the uterus in the position of the bladder. During this examination she had one of her attacks of pain. There was no doubt about the severity of the pain at this time. She was then sent to the hospital for observation. While in the hospital the mass in the region of the bladder began to increase in size and operation was decided upon. Temperature ranged around 100 degrees; the white blood cell count was 28,000 and 22,000 on two different occasions; the urine showed a very faint trace of albumin.

Pathological Findings—On opening the abdomen a small amount of blood-stained fluid escaped and a tense, gangrenous ovarian cyst, the size of a large orange, twisted on its pedicle, presented. It was not adherent and was easily removed. The pathologist described the tissue as an ovarian cyst, roughly 10 cm. in diameter, the capsule of which was grayish red and contained serous fluid and blood-clots. Pathologic diagnosis was: hemorrhagic ovarian cyst.

Comment—One of the interesting features of this case was the recurrent attacks of pain, high up the abdomen rather than in the region of the ovary, and simulating renal colic so closely that one of the consultants insisted that the case could be nothing else. It was not until the mass in the region of the bladder was definitely tender and palpable that the attention was definitely focused in the pelvis.

Case 2—The second patient was a spinster, age thirty-six years. Her periods had always been regular, but recently they had become more profuse and more painful. For the past two months she had noticed a fullness in the lower abdomen associated with backache and urinary frequency. She thought the mass had grown larger recently and that she had lost some weight from worry. Vaginal examination was impossible and bimanual rectal examination revealed a large, apparently solid tumor, about the size of a five months' pregnancy, in the region of the uterus. The tumor was fixed and was high in the pelvis. The cervix could be felt through the rectovaginal wall, but the body of the uterus could not be made out. The diagnosis of fibromyomata was made and operation was advised. The patient refused operation at this time, but returned two months later with the observation that the tumor had increased in size or else she had lost weight from worry. (After the operation she stated that the mass appeared to become larger at the menstrual periods.)

Pathological Findings—On opening the abdomen, a large bluish-black cystic left ovary which filled the whole of the pelvic cavity was found. Adhesions held the mass securely in the pelvis. On attempting to free the ovary from its attachment to the sigmoid and the posterior leaf of the left broad ligament, the cyst was ruptured and its chocolate-like contents spilled over the field of operation. After its removal the posterior cul-de-sac was found to contain many firm, nodular adhesions. The right ovary was apparently normal. Two small fibroids were also removed from the posterior surface of the uterus.

Unfortunately the pathologist, in a single section of the sac, failed to find any glandular tissue. This is not uncommon, for in some of the larger cysts the endometrial tissue is entirely absent except at the point of perforation, which is the area of attachment. From the clinical story and operative findings the case was clearly that of a chocolate cyst of the ovary, with pelvic implants.

Comment—This case was particularly interesting because of the recent work of Sampson and others on the causes of certain peculiar, benign growths in the pelvis. He was the first to recognize the similarity of the contents of chocolate cysts and that of retained menstrual secretions which occur in girls with imperforate hymen or in women with atresia of the vagina. Sampson found that these cyst walls are lined with typical endometrial tissue. This opened up a new field of study and has thrown additional light on other unexplained pelvic conditions. At present we find endometrial implants in the surface of the uterus or the surface of fibromyomata, plastered over the ligaments of the uterus, causing firm adhesions and even extending into inguinal hernia sacs. They have been found implanted in abdominal scars following hysterectomy or cesarian section. Sampson makes the statement that perforating hemorrhagic cysts occur in 10 per cent of women past thirty years who require abdominal operation for pelvic disease.

Another interesting point about these cysts is their tendency to become adherent to the adjacent tissues where they perforate and then implant

themselves into the natural pockets of the pelvis, similarly to cancer or ovarian papilloma. The firm adhesions which they form are the result of the irritating action of the cyst contents upon the peritoneum. In some cases the firm nodular bands may even simulate malignancy.

CASE 3—The third patient was a young lady, twenty-four years of age, who had been married one year and had never been pregnant. She gave a history of two or three previous attacks of pain in the right lower quadrant and had been told it was due to appendicitis. Her periods had always been regular. The last period was entirely normal and began twenty days before the onset of her present illness.

The attack, because of which she consulted me, began about 10 p. m. June 22, 1927, as a sudden, severe pain in the lower abdomen, associated with nausea and vomiting. About midnight the pain became unbearable. When I first saw her she was suffering from intense pain in the lower abdomen. She stated that she had fainted two or three times when she had tried to get up and that it hurt her to turn from side to side. The clinical picture was that of acute appendicitis with possible rupture. The abdominal wall was held tense and deep palpation elicited more pain in the region of the appendix than any other spot. The patient was taken immediately to the hospital where another surgeon saw her in consultation. Although the temperature was normal, we both felt that the case was so typical of appendicitis that a blood count was not necessary.

The incision was made directly over the appendix. On reaching the peritoneum the bluish shimmer of intra-abdominal hemorrhage was noted. On opening the peritoneum about one quart of bright, red fluid escaped. The bleeding point was immediately sought in the right tube which, to our surprise, was normal. A median incision was then made and the bleeding point searched for. Both tubes were found normal and both ovaries appeared to be free of disease. On closer examination a ruptured corpus luteum cyst was observed in the right ovary. This was quickly excised and the edges brought together.

Before closing the right rectus incision the appendix was examined more from curiosity than for removal because of the patient's condition. To our surprise the outer one-half was acutely inflamed and covered by a thin film of fibrin. To have overlooked the appendix would undoubtedly have proven disastrous.

Pathological Findings—The specimen consists of an appendix 5½ x 1 cm. and a small piece of ovarian tissue. The serosa and mucosa of the appendix were moderately injected. The walls were moderately fibrous. There was a small amount of pus in the lumen. At the distal end there was a small nodular projection, which was red and about 3 cm. in diameter. The ovarian tissue was a corpus luteum containing a small amount of blood. Microscopic sections of the pigmented area on the appendix and also the ovarian tissue failed to show any endometrial rests.

Pathological Diagnosis—Acute suppurative appendicitis. Corpus luteum cyst of ovary.

During the convalescence this patient's temperature remained elevated for about ten days. Otherwise it was uneventful. A very interesting feature during convalescence was the premature onset of menstruation following the removal of the corpus luteum which bears out recent statements regarding its inhibitory action on menstruation. It has long been noted by veterinarians that delayed estrum in cattle is due to a persistent corpus luteum. By grasping the ovary and rupturing the luteum cyst they are able to bring on estrum within forty-eight hours or, in the case of the pregnant cow, they are able to produce an immediate abortion.

Comment—Most cases of ruptured follicles or corpus luteum cysts are erroneously diagnosed as appendicitis, salpingitis or ectopic gestations. This case presents the unusual feature of having an acute appendicitis complicated by a ruptured corpus luteum. I am really unable to tell which was the primary lesion. It is barely possible that the cyst ruptured during one of the vomiting spells, although no one can say definitely that this was the case. We do know, however, that pelvic engorgement plus trauma has caused this condition.

CONCLUSIONS

These three cases are reported because they illustrate the three clinical types of ovarian hematomata and the difficulty of making a correct diagnosis. The diagnosis of such cases is usually confused with appendicitis, salpingitis, ectopic gestation, renal disturbances or pelvic growths. Many cases go unrecognized even at operation, being frequently mistaken for ovarian pregnancy. They constitute a definite surgical entity and should be considered in all diagnostic considerations of acute abdominal conditions of women.

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DISCUSSION

EZRA C. RICH, M. D. (2650 Washington Avenue, Ogden)—The classification Doctor Hunter has accepted would seem to indicate that each case studied can be charted. In his reported cases no fault can be found with the method he used, the time he took, or the interest he devoted to careful study and diagnosis. Yet in each case his correct diagnosis was not made till after the operation. Very few operators would have done better.

In the class of cases with twisted pedicle and hemorrhage into the cyst, I have been impressed with the amount of shock present without the visible loss of blood to account for the condition. The sense of weight these patients complained of over the site of the cyst, which weight can be confirmed many times by vaginal examination, has also been noted.

The pain in this class of cases is usually severe and early operation is often demanded by the patient.

The class of chocolate cysts furnishes one of the interesting subjects in surgery at the present time. The recent studies of Sampson, Bell, and other investigators has added a great deal to our knowledge. Diagnosis before operation is extremely difficult, yet a few signs and symptoms are significant. The pain is not so severe; the case does not seem so urgent; it is more likely to occur midway between the menstrual periods; the mass, as in Doctor Hunter's case, is unilateral; the implantations in Douglas' pouch should furnish some information and the age of the patient is the age of ovarian activity.

The rupture of corpus luteum cysts rarely gives rise to any serious symptoms. In a severe hemorrhage into the pelvis, there is usually considerable intestinal irritation, and enemas and bowel movements are quite painful. As in Doctor Hunter's case, severe hemorrhage demands immediate operation.

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RALPH T. RICHARDS, M. D. (Salt Lake Clinic, Salt Lake City)—It is comforting to learn from Doctor Hunter's paper that other surgeons encounter at operation pathological conditions in the pelvis unsuspected before.

Related to ovarian hematomata there is one subject which has practical diagnostic significance. I refer to ovarian congestion.

This matter was first drawn to my attention by a physician whom I met in consultation regarding a suspected case of acute appendicitis in a girl of eighteen. She had walked home from church with her fiance, and they had sat in the front room by themselves, whiling away the hours in mutual expression and

demonstrations of affection. During the evening she complained of nausea and pain and tenderness in the right lower abdomen. The physician called, he diagnosed acute appendicitis but postponed operation until morning.

In the morning a consultation was held, and after re-examining the patient, finding rectal tenderness on digital examination and definite abdominal tenderness on the right side, with moderate rigidity, two young enthusiastic consultants, of whom I was one, said, "Appendicitis—operate." The older man, in whom the family had more confidence, said, "The young lady has acute appendicitis that cannot be cured by operation. It is the kind that will get well when she is married."

This practitioner told us that he had seen quite a number of young girls who suffered the same symptoms from enthusiastic, prolonged, but perfectly virtuous displays of affection.

In July 1921, about midnight, a physician in the nearby suburb phoned me to meet him in the hospital; he was bringing in a young lady who had acute appendicitis who needed an immediate operation. On the way to the hospital something seemed to "give way," the patient stated, and the pain became easier. At my examination, I found a definite tenderness across the lower half of the abdomen with moderate rigidity. The tenderness was worse on the right side. Pulse was slightly elevated. Temperature normal. Patient looked pale and anxious, suggesting possibility of internal hemorrhage. Pelvic examination: virginal type, rectal finger against cervix caused pain on moving uterus. Could not outline uterus because of tenderness. No mass or fluctuation determined in cul-de-sac.

The history had not been satisfactorily obtained before examination. It was then reviewed and the patient admitted that for two hours preceding her trip to the hospital she had been caressed by her fiance. Diagnosis was made of ovarian congestion—possibility of ovarian rupture with hemorrhage. At operation the diagnosis was corroborated. The right ovary showed a recent rupture; slight oozing still evident, and about eight ounces of bloody fluid and clots in the cul-de-sac. Appendix normal. In all probability there may have been an ovarian hematoma, which was relieved by rupture at the time of her trip in the automobile.

On one other occasion I kept a girl who was going to get married, in bed one week prior to her marriage, because of pelvic pain and soreness. During this time I refused to allow her intended husband to see her. She went away on a week's honeymoon. On her return she told me that she had had no further tenderness or pain and she knew she wasn't going to have.

These cases are mentioned because they typify a condition little discussed medically or surgically; and yet ovarian congestion is of vital importance, as errors in diagnosis may lead to unnecessary abdominal operations.

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L. A. Stevenson, M. D. (903 Medical Arts Building, Salt Lake City)—I have read carefully and with interest the excellent paper on ovarian hematoma by Doctor Hunter.

I am sure many surgeons will confess to themselves, at least, they have been overlooking ovarian hematomas, especially those coming under second and third classification: menstruating adenomas, ovarian follicles, and corpus luteum cysts.

The ovarian cyst with a torsion of the pedicle is an event of not infrequent occurrence. The torsion may consist of one partial turn or there may be many complete turns. Many causes for this rotation have been ascribed, yet it is difficult to state a definite etiology in most cases. The results will depend upon the amount of compression on the vessels which supply the tumor. The veins being more compressible are the first to suffer, consequently the venous congestion becomes marked and sooner or later, depending on the degree of strangulation, the vessels give way and the blood is passed into the cyst wall and cavity, causing a rapid growth of the tumor: this associated with severe abdominal pain, pallor, and shock, is fairly characteristic of an ovarian cyst on a twisted pedicle. A previous knowledge of an existing cyst makes the diagnosis more easy. In my cases the clinical course has been tense and dramatic. I have no difficulty in recalling vividly, the symptoms, pathology and treatment in each case.

From an academic point of view, the etiology of menstruating adenomas is of special interest. The second clinical case as reported by Doctor Hunter is very important from many angles, and illustrates and confirms the research work of Sampson and collaborators on this subject. There seems no doubt that adenomyomas are of mucosal origin. The work of Chiari, Baraban, Pilliet, and especially that of Cullen through writings and illustrations of the subject, demonstrate that adenomyomas of the uterine wall have their origin from endometrial cells. He concludes there is an invasion of the wall of the uterus by mucosal cells, which are later cut off. This seems to be true of adenomas of the tubes also. Histological examination has demonstrated ciliated epithelium lining their cavities similar to tubal mucosa.

But what about the origin of extra uterine adenomas; on the surface of the uterus in the cul-de-sac, on the ovary, and within the ovary? They cannot be explained by the invasion and cutting-off process. There must be some other theory for their origin. Many theories have been given by various writers, but the one advanced by Dr. John A. Sampson, who is frequently referred to, seems the most logical and convincing. It is also quite in harmony with the clinical course of these cases. The fact that most of the hematomas of this class occur in women after thirty years of age would suggest the implantation theory, rather than the theory they were of Wolffian or Müllerian duct origin. If the latter theory were true it seems there should be as many of these hemorrhagic cysts of the ovary in early menstrual activity before thirty years of age. After thirty years we find more of the obstructive pathology to the natural passage of the menstrual flow. Retroversion and retroflexed uteri would be favorable to back flow of blood through tubes into the peritoneal cavity, carrying with it endometrial cells from the uterus and ciliated cells from the tube, which might be implanted on the surface of the uterus, ovary, and in the pelvis. These cells no doubt invade the ovarian tissue. The same causes produce menstruation, stimulate these implants to periodical bleeding, and as a result the ovarian hematoma, sometimes referred to as the chocolate cyst.

A brief résumé of Sampson's conclusions are: That ovarian hematomata are histologically of endometrial origin which reacts to menstruation.

The hemorrhage is periodically repeated as shown by fresh blood and pigment, the latter an evidence of previous hemorrhage.

The important consideration, it seems to me, in treatment, is to remove, as far as possible, without rupture or aspiration, all cysts of the pelvis. There may not be much harm done by the aspiration or rupture of a nonmalignant hematoma, but to soil the pelvic viscera with the contents of a papillomatous or malignant cyst, causing malignant implants, would be without doubt a serious mistake.

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Doctor Hunter (closing)—Doctor Richards has called my attention to a condition which I had almost forgotten. The literature is peculiarly inadequate regarding this condition. I recall two such cases of acute ovarian congestion ("stone gullion") following sexual excitement which I failed to recognize at the time. Happily the patients refused surgical intervention and saved themselves an operation. I feel sure that mild cases are frequently overlooked.

Recently I had an opportunity to observe the regurgitation of menstrual blood through the fallopian tubes. The patient had no acute symptoms of peritoneal irritation whatsoever. I stripped the tubes to make sure of the source of bleeding.